National Institute of Environmental Health Sciences

Bacterial colonization increases daily symptoms in patients with chronic obstructive pulmonary disease

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Abstract:

Rationale: Respiratory pathogens are frequently isolated from the airways of patients with chronic obstructive pulmonary disease (COPD) in the absence of an exacerbation. This bacterial "colonization" by potential pathogens is associated with host inflammatory and immune responses, which could increase respiratory symptoms. Objectives: To study whether bacterial colonization impacts daily respiratory symptoms in COPD. Methods: In a longitudinal prospective observational study of COPD, patients recorded daily symptoms electronically on the Breathlessness, Cough, and Sputum Scale (BCSS). Sputum cultures and quantitative polymerase chain reaction (PCR) were performed every 2 weeks. The relationship of BCSS and bacterial colonization was analyzed with generalized linear mixed effects models, after controlling for exacerbations, weather conditions, lung function, and demographic variables. Measurements and Main Results: A total of 41 patients recorded daily symptoms for 12,527 days. The average BCSS score was higher during the periods of colonization, determined by sputum culture with one or more of the following pathogens: nontypeable Haemophilus influenzae, Moraxella catarrhalis, Streptococcus pneumoniae, and Pseudomonas aeruginosa, compared to periods without colonization (5.28 vs. 4.46; P Euro Surveillance (Bulletin Europeen Sur Les Maladies Transmissibles; European Communicable Disease Bulletin) 0.008) after controlling for confounding variables. The finding did not change when colonization was defined by quantitative PCR(average BCSS, 4.77 vs. 4.25; P Euro Surveillance (Bulletin Europeen Sur Les Maladies Transmissibles; European Communicable Disease Bulletin)0.006). Sputum IL-8 levels were elevated with bacterial colonization. Conclusions: Even in the absence of clinical exacerbation, colonization by bacterial pathogens in COPD was associated with a clinically significant moderate increase in daily symptoms, likely mediated by increased airway in flammation. Novel therapies that decrease bacterial colonization in COPD could improve daily symptoms and quality of life.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Air Pollution, Meteorological Factors, Precipitation, Temperature

Air Pollution: Ozone, Particulate Matter, Other Air Pollution

Air Pollution (other): CO; SO2; NO2

Temperature: Fluctuations

Geographic Feature: ☑

resource focuses on specific type of geography

None or Unspecified

Geographic Location: ☑

resource focuses on specific location

United States

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Respiratory Effect

Respiratory Effect: Chronic Obstructive Pulmonary Disease, Other Respiratory Effect

Respiratory Condition (other) : Daily respiratory symptoms; Respiratory infection

Population of Concern: A focus of content

Population of Concern: ☑

populations at particular risk or vulnerability to climate change impacts

Elderly

Other Vulnerable Population: Smoking status

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Time Scale Unspecified